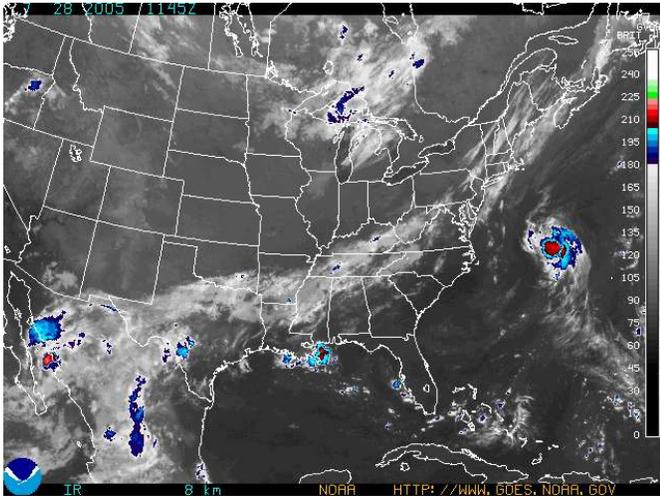


Virginia Water Central

Virginia Water Resources Research Center Blacksburg, Virginia August 2005 (No. 35)



A cold front moves across the eastern United States on July 28, 2005. For precipitation data over the past several months, please see the Water Status Report. Photo from the National Oceanic and Atmospheric Administration, www.goes.noaa.gov/.

FEATURE ARTICLE

Changes for Virginia's Environmental Laboratory Certification Program

Regulations have been proposed by the Division of Consolidated Laboratory Services (DCLS) to establish a program to certify laboratories that perform environmental tests in support of the Commonwealth's air, waste, and water laws and regulations. As of early August 2005, DCLS had completed its review of the latest round of public comments and the draft final regulations, and the executive branch had begun its last review of the final regulation package.

Water Central presents here two fact sheets that the Virginia Water Monitoring Council prepared on the regulations. The first, beginning on page 2, answers frequently asked questions that pertain specifically to the proposed regulations for *laboratories* that support Virginia's water laws and regulations. The second, beginning on page 4, describes the potential effects of the proposed regulations on Virginia *citizen groups* that conduct water-quality monitoring. (The two fact sheets duplicate each other to some extent; they have been slightly edited here for space.)

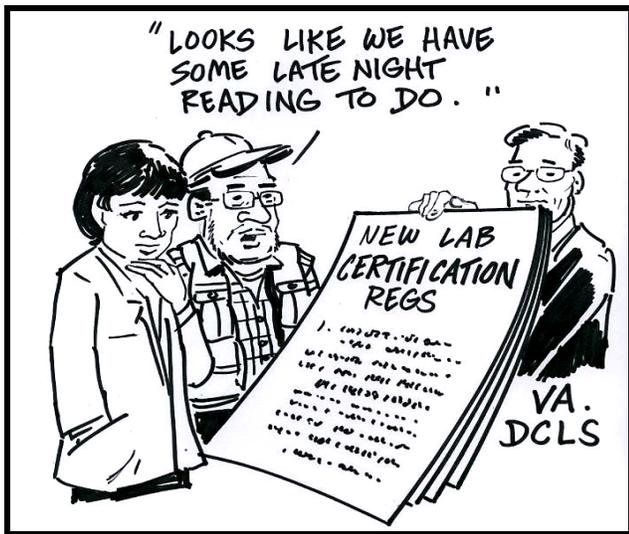
References in bold and parentheses—such as **(1 VAC 30-45-500)**—refer to the eventual sections in the *Virginia Administrative Code* (when the regulations are finally approved; the Code did not include the referenced sections as of August 3, 2005). The *Administrative Code* is available online at leg1.state.va.us.

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VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY



Impacts of Virginia's New Laboratory Certification Regulations on Laboratories

1.) What is the purpose of the proposed laboratory certification program?

The purpose of the program is to ensure that environmental laboratories that submit data for use by the Virginia Department of Environmental Quality (DEQ) will conduct analyses accurately and consistently. In addition, once the certification program is in place, all environmental laboratories must be certified in order to submit their data to DEQ. DEQ may not use data from laboratories that are not certified once the program is established. The program will be established three years from the date the regulations become effective. During these three years, laboratories should submit applications for certification, and DCLS will review these applications to determine whether the laboratories meet the certification standards.

2.) Which laboratories will be affected by the proposed regulations?

Any laboratory that analyzes samples in support of the state's water, waste, or air laws will need to meet these new regulations. This rule will cover local sewage treatment plants, industries, and their laboratory contractors. Also, any water data used by DEQ in its Assessment Program (under sections 305b and 303d of the Clean Water Act) will need to come from certified laboratories, including data from federal government laboratories, such as the

U.S. Environmental Protection Agency; state government laboratories; and citizen monitoring groups. The Total Maximum Daily Load (TMDL) program will be affected because any laboratory data used in the TMDL process will need to come from a certified laboratory. Laboratories submitting data for TMDL development primarily include environmental consulting firms and universities.

3.) What are the general laboratory certification requirements outlined in the proposed regulations?

- a.) Laboratories must pass an on-site assessment to become certified and repeat the assessment at renewal every two years.
- b.) Laboratories must pass two proficiency tests per year for each field of certification. The proficiency test—where a known concentration of an analyte is tested in the laboratory—is used to ensure that the test procedure properly detects the analyte at the correct concentration level. **(1 VAC 30-45-500)**
- c.) For commercial laboratories (in general, those that analyze samples for others), there are significant educational requirements as outlined in section 4.1.1.1 of the 2003 National Environmental Laboratory Accreditation Conference (NELAC) standards, found online at www.epa.gov/nelac/. For non-commercial laboratories (in general, those that only analyze samples from their own monitoring activities), there are two educational requirements:
 - i. The manager of a non-commercial laboratory must have at least two years experience managing an environmental laboratory or performing the analysis that will be subject to certification **(1 VAC 30-45-200)**.
 - ii. The quality assurance (QA) officer of a non-commercial laboratory must possess documented training or experience in quality assurance/quality control (QA/QC) procedures and have a QA/QC system in place. In addition, the QA officer must have knowledge of the test methods that are under their review **(1 VAC 30-45-210)**.

There are some exceptions to these requirements. **(1 VAC 30-45-200)**
- d.) Certified laboratories will need to pay fees to cover the costs associated with the certification and re-certification process and to cover the costs associated with the proficiency tests.

- i. Each laboratory must pay certification fees to become certified and to remain certified. The fees will vary according to the number and type of laboratory analyses being performed. For example, fees for non-commercial laboratories are expected to range from \$475 to \$5,200 biennially. Commercial laboratories are expected to pay biennial fees from \$2,075 to \$5,200. **(1 VAC 30-46-130)** [*Ed. note:* Please see the second fact sheet for or more on fees.]
- ii. Additionally, each laboratory must pay proficiency test fees to cover the costs of the proficiency tests. These costs vary based on the type of analyte being tested but typically range from \$50 per test for a simple analysis like total suspended solids (TSS) to over \$200 for bacteria analysis and other complex analyses. It is expected that proficiency fees will result in an additional cost to laboratories of at least \$100 to well over \$400 each year based on the number and types of proficiency tests performed.

4.) What monitoring activities are exempt from the proposed regulations?

Some environmental analyses are exempted from the proposed standards because the tests have to occur in the field. The exempted field tests include continuous emissions monitoring; on-line monitoring; flow monitoring; tests for pH, residual chlorine, temperature and dissolved oxygen; and field analysis for soil gas (**1 VAC 30-45-40**). If the test is conducted in the laboratory instead of in the field, the test will fall under the certification program.

Currently, benthic macroinvertebrate monitoring will not be covered under the new rule because no national standards have been established. Once standards are developed for macroinvertebrate monitoring, DCLS may add this type of testing to its certification program. If so, DCLS will initiate a rulemaking for this purpose.

5.) What are the potential advantages of the proposed regulations?

These regulations were developed to provide quality assurance and quality control standards that all environmental laboratories providing data to DEQ would need to follow. Certified laboratories should then be able to produce data that are accurate and consistent. To be acceptable generally and also in a court of

law, the method or process used to derive data must be traceable and replicable.

6.) What are the potential disadvantages of the proposed regulations?

The regulations will result in increased laboratory costs that may be passed on to the laboratory's customers. If these costs are passed on, the laboratory customers will either need to increase their budgets for water sample analyses, decrease the number of samples being analyzed, or decrease the number of analyses per sample. These regulations could, therefore, have a significant impact on the overall budgets of various monitoring groups, including citizen monitoring organizations, small businesses, local governments, state agencies, and others. It could also result in less water monitoring throughout the Commonwealth of Virginia.

Because all data for the DEQ Water Quality Assessment Program (305b/303d) will need to be generated from certified laboratories, laboratories that in the past have met DEQ quality assurance/quality control (QA/QC) requirements and provided data but cannot afford the certification fees may elect to stop submitting data to DEQ. Alternatively, monitoring organizations that use certified laboratories may require a fee for sharing their data. Either action could limit citizen input in future water quality assessments and would hinder DEQ from expanding the coverage of assessed waters in Virginia.

7.) What is the expected timeline for adoption of the laboratory certification regulations?

The Director of the Department of General Services, the Department of Planning and Budget, and the Secretary of Administration have approved the final regulation package. The next stage of the rulemaking is review by the Governor's Policy Office. Once the Governor's Policy Office approves the final regulation package, the final regulations can then be printed in the *Virginia Register of Regulations*. This publication starts the last phrase of the rulemaking. Thirty days following publication or on a date assigned by the agency, the regulations become final. DCLS anticipates an effective date in the late summer of 2005.

Impacts of Virginia's New Lab Certification Regulations on Citizen Monitoring Groups

Citizen groups that monitor water quality may be affected by the certification regulations for Virginia laboratories. The Virginia Division of Consolidated Laboratory Services (DCLS) proposed the regulations for laboratories that perform environmental tests as required by the environmental laboratory certification program statute (§2.2-1105 of the *Code of Virginia*). The statute states that the program's purpose is to set standards for environmental laboratories to ensure accurate and consistent testing. Any laboratory that analyzes samples in support of the State Water Control Law, the Virginia Waste Management Act, or Virginia's air law will need to meet these new standards.

For laboratories to become certified, they will have to pay fees to attain and maintain their certification and to conduct proficiency tests. These fees may increase the costs for laboratory customers, including citizen monitoring groups. In addition, citizen monitoring groups that conduct their own laboratory analyses would be subject to the certification fees and proficiency testing fees if they apply for certification.

The following information summarizes the potential effects of the proposed regulations on citizen monitoring groups, first for those that use outside laboratories, and second for those that choose to do their own analyses.

Shopping for a Laboratory?

Increase in laboratory fees. Due to the certification fees and proficiency test costs, an increase in the cost of laboratory analysis is likely. Because many citizen groups have tight budgets, higher costs for laboratory analyses will increase financial pressure on them. As a result, citizen groups that use certified laboratories may be forced to reduce their monitoring or find additional funding for laboratory services.

Reduced laboratory choice for citizen groups. Citizen monitors could have fewer choices in selecting laboratories to perform analyses. Many citizen groups work with college and university laboratories. Colleges and universities may decline to participate in the environmental laboratory certification

program because of the fees that would be assessed.

Greater citizen monitoring startup costs. Newly organized citizen monitoring groups face significant startup costs, and the additional analysis costs caused directly or indirectly by the proposed regulation may further impede new groups.

Reduced monitoring of parameters. Citizen monitoring groups may decide to stop monitoring for parameters that would fall under the fee structure proposed by the regulations.

Reduced data submission to DEQ. All data used for the Virginia Department of Environmental Quality water quality assessment program (305b/303d) will have to come through a certified laboratory. As a result, some citizen groups may elect to stop submitting data to DEQ. Doing so would limit citizen input in future water quality assessments, and in turn, hinder DEQ from expanding the coverage of assessed waters in Virginia.

Applying for Certification?

For citizen monitoring groups applying for certification, the following provides details on fees and other requirements.

Certification Fees. Citizen monitoring groups that conduct their own water quality laboratory analyses and choose to apply for certification would have to pay the certification fees and proficiency testing costs. An environmental laboratory must pay a required fee to attain and maintain certification, which is valid for two years. Thus, either a certification or re-certification fee will be charged to the laboratory every two years.

Each laboratory will be charged a **base fee** and a **test category fee** for each category of test it conducts. The total fee charged for certification cannot exceed the maximum fee set for each type of laboratory. **(1 VAC 30-45-130)**

1. Base Fees

Non-commercial laboratories—For non-commercial laboratories performing only *simple* test procedures, the base fee is \$100. Simple test procedures are classified as the following tests:

- 5-day biochemical oxygen demand;
- fecal and total coliform, fecal streptococci, *E. coli*, enterococci;
- total solids, settleable solids, total dissolved

solids, total suspended solids, total volatile solids, and total volatile suspended solids.

For non-commercial laboratories that perform tests *beyond the type of tests listed above* in the simple analysis section, the base fee is \$1,700.

Commercial laboratories—The base fee for commercial laboratories is \$1,700. Citizen groups who analyze samples in their own laboratory from *other* citizen groups will be considered a commercial laboratory under the proposed regulations.

2. Test Fees for Categories of Tests

The following table lists fees for the various categories.

TEST CATEGORY	FEE
Oxygen demand (BOD or COD)	\$375
Bacteriology	\$375
Inorganic chemistry, fewer than four methods	\$375
Inorganic chemistry, four or more methods	\$750
Chemistry metals, one - two methods	\$450
Chemistry metals, more than two methods	\$1,000
Organic chemistry, fewer than four methods	\$600
Organic chemistry, four or more methods	\$1,200
Aquatic toxicity, acute methods only	\$400
Aquatic toxicity, acute and chronic methods	\$700
Radiochemical	\$1,000
Physical (e.g., solids, turbidity, color)	\$375

The total certification fee will vary according to the type of base fee assessed and the number and type of analyses being performed. For example, if a laboratory is classified as a commercial laboratory, a base fee of \$1,700 will be assessed. If the laboratory wishes to be certified for running two types of inorganic chemistry tests (nitrogen and phosphorous), the test fee of \$375 will be added to the base fee. The final total fee in this example would be \$2,075.

If the total amount exceeds a designated maximum fee, the laboratory will pay the maximum fee. For laboratories performing only simple test procedures, the maximum fee is \$600. For non-commercial and commercial laboratories that perform tests beyond the

simple test procedures, the maximum fee is \$5,200. **(1 VAC 30-46-130)**

Exempted Activities. The regulations currently state that there are exempted monitoring activities that will not be under the proposed fee structure. The proposed regulations have the following clause for tests that would be exempted from fees:

“The following is a limited list of currently recognized field tests or measures that is not intended to be complete: continuous emissions monitoring; on-line monitoring; flow monitoring; tests for pH, residual chlorine, temperature and dissolved oxygen; and field analysis for soil gas.”

Field testing is not covered by the program unless the field test is performed in the laboratory instead of in the field. **(1 VAC 30-45-40)**

Benthic macroinvertebrate monitoring also is exempt from the program. No national standards for this monitoring have been established. If national standards are developed, DCLS will consider adding this type of testing to the program. DCLS would be required to initiate a rulemaking to add this testing to the program.

On-site Assessment. Laboratories will undergo an on-site evaluation as part of the initial certification and the renewal every two years. **(1 VAC 30-45-300)**

Proficiency Testing. In addition to the certification fees and laboratory inspection, the proposed regulations also require that a laboratory perform two proficiency tests per year for each field of certification for which the laboratory wishes to be certified (for example, for a particular analytical method). The proficiency test is where a known concentration of an analyte is tested in the laboratory. This test is used to ensure that the procedure properly detects the analyte and the correct concentration level. Proficiency test analytes are purchased from providers approved by either the National Environmental Laboratory Accreditation Conference (NELAC) or DCLS. The tests are performed in the laboratory and sent to the provider, who determines if the results are within the allowable range. The provider then submits a report to DCLS and the laboratory. **(1 VAC 30-45-500)**

Proficiency test costs can vary based on the type of analyte being tested. These costs typically range from \$50 per test for a simple

analysis (such as total suspended solids) to over \$200 for fecal coliform and other bacteria analyses. The proficiency tests will result in an additional cost to laboratories of at least \$100 to well over \$400 each year based on the number and types of proficiency tests that are analyzed. The proficiency test costs are in addition to the certification fees.

Educational Requirements. The regulations establish educational requirements for the **laboratory manager** and **quality assurance (QA) officer**.

The laboratory manager must have at least two years experience managing an environmental laboratory or performing the analysis that will be subject to certification. There are exceptions to this requirement. **(1 VAC 30-45-200)**

The QA officer must possess documented training or experience in quality assurance/quality control (QA/QC) procedures and have a QA/QC system in place. In addition, the QA officer must have knowledge of the test methods that are under their review. **(1 VAC 30-45-210)**

The laboratory manager of a commercial laboratory must have a minimum of a bachelor's degree in the chemical, environmental, biological, or physical sciences or engineering, with at least 24 college semester credit hours in chemistry and at least two years of experience in the environmental analysis of

representative inorganic and organic analyses for which the laboratory seeks or maintains certification. A masters or doctoral degree in one of the above disciplines may be substituted for one year of experience. (See the 2003 NELAC Standards, section 4.1.1.1., available online at www.epa.gov/nelac/.)

For More Information

DCLS has staff available to provide assistance in understanding the regulations and determining the costs of fees. The current contact (as of August 2005) for the regulations is Nancy Saylor, (804) 231-7980 or nssaylor@erols.com.

Presently, the proposed regulations are available in PDF format on the Virginia Water Monitoring Council's Web site, www.vwrrc.vt.edu/vwmc/. To learn more about NELAC, which establishes and promotes mutually acceptable performance standards for the operation of environmental laboratories, see the Web site www.epa.gov/nelac/.

This article was based on fact sheets provided by the Virginia Water Monitoring Council.

For more information on the Virginia Water Monitoring Council, contact Jane Walker at (540) 231-4159 or janewalk@vt.edu.

TEACHING WATER

Especially for Virginia's K-12 teachers

This Issue and the Virginia Standards of Learning

Below are suggestions for Virginia Standards of Learning (SOLs) that may be supported by this issue's Science article, Water Status Report, and For the Record section. The SOLs listed below are from Virginia's 2003 Science SOLs and 2001 Social Studies SOLs. Abbreviations: BIO = biology; CE = civics and economics; ES=earth science; GOVT = Va. and U.S. government; LS=life science; US.II = U.S. History; WG = world geography.

Newsletter Section	Science SOLs	Social Studies SOLs
Science (Biosolids)	LS.12, ES.7, ES.9, BIO.9	WG.7, GOVT.9
Water Status (Precipitation)	4.6, 4.8, 6.6, ES.13	WG.2
For the Record (Maps)	4.8, 6.5, 6.7, 6.9, ES.3, ES.7, ES.9	VS.1, USII.1, CE.1, WG.1, WG.7, GOVT.1

SCIENCE BEHIND THE NEWS

The Widespread Issue of Spreading Biosolids

The spreading of waste, both human and animal, as nutrient-rich fertilizer, has been practiced for centuries, both for its agricultural value and as a way to dispose of waste. Today, the solid material remaining after human wastewater treatment is often applied to land, and the term coined in the 1990 in regard to this practice is **biosolids**. This term, often used interchangeably with **sewage sludge** (for the difference, please see the next section), has become shorthand for a complex set of issues, particularly regarding *land application* of biosolids.

Communities all over the nation, as well as in Virginia, which are involved with land application of biosolids must deal with a range of scientific questions, laws and regulations, and public perceptions and opinions. For example, a March 2005 public meeting on biosolids in Montgomery County, Virginia, brought out over 100 citizens, the vast majority of whom opposed a special-permit request to land-apply biosolids near a rural neighborhood.¹ Proposals to land-apply biosolids have made news in recent years in many other Virginia localities, as well.² In addition, the 2005 Virginia General Assembly considered nine bills (six passed, three failed) dealing with land application of sewage sludge (for a list of these bills, please see the April 2005 issue of *Water Central*, pp. 9-10).

¹ Greg Esposito, "Neighbors Say No to Sludge," *Roanoke Times* (*New River Valley Current*), 3/11/05.

² Representative headlines include the following: "Biosolids Stir Stink in County," *Altavista Journal*, 4/22/04; "Sludge Prompts Disease Fears," *Washington Times*, 4/29/04; "Supervisors Consider Monitoring Sludge," [Woodstock] *Free Press*, 12/9/04; "Sludge Applications Raise Bay Act Issues," *Rappahannock Record*, 12/28/04; "Isle of Wight to Ask that Requests for Sewage Fertilizer Be Denied," *Virginian-Pilot*, 7/26/06; "Sludge a Hot Topic in Elkton," *Harrisonburg News-Record*, 7/27/05; and "Sludge Divides Farmers, Neighbors," *Fredericksburg Free Lance-Star*, 8/7/05.

When examining proposals for land application of biosolids, citizens and public officials often face confusing technical language and a daunting amount of information, yet are called upon to make informed judgments about potential health risks, biosolids-application monitoring, and particular aspects of given biosolids-application situation. This article seeks to provide citizens with a basic introduction to biosolids, their regulation, and the key questions that may arise over land application of biosolids.

What are Biosolids, and Why Land Apply Them?

The regulations regarding biosolids standards are found under the U.S. Environmental Protection Agency's (EPA) rule, *The Standards for the Use or Disposal of Sewage Sludge*. As these regulations are contained in Title 40 of the Code of Federal Regulations, Part 503, they are more commonly referred to as the **Part 503 rule**. Any state regulations are required by federal law to be *at least* as stringent as the Part 503 Rule.³



³ For more on this rule, see the EPA Web site at www.epa.gov/owm/mtb/biosolids/503pe/index.htm.

When reading about biosolids in the news, you may find the terms “biosolids” and “sewage sludge” used interchangeably. This is not entirely accurate. “Sewage sludge” refers to the solid material remaining after domestic or industrial wastewater is treated and discharged at a sewage treatment plant. “Biosolids” is defined in Virginia regulations⁴ as “a sewage sludge that has received an established treatment for a required level of **pathogen** control and has been treated or managed to reduce **vector** attraction to a specified level and contains acceptable levels of pollutants in accordance with an issued permit.” (Pathogens and vectors are discussed in the next section.)

The specific makeup of biosolids depends on the original wastewater and on the treatment processes used prior to land application. Land-applied biosolids are not completely *solid*, but rather contain different amounts of water, again depending on treatment. Commonly seen categorizations of biosolids include “liquid,” with 2 to 12 percent solids; “dewatered,” with 12 to 30 percent solids (the most frequent practice); and “dried” or “composted,” with about 50 percent solids.⁵

One reason why biosolids are spread on land⁶ is because they offer an inexpensive alternative to commercial agricultural fertilizers. Biosolids contain nutrients that are beneficial to plants, and the application of biosolids adds organic matter to soils, which can have several benefits (such as increasing the moisture-holding capacity of the soil). Also, “lime-stabilized” biosolids can reduce soil acidity levels.⁷

Other methods of sewage-sludge disposal are *landfilling* and *incineration*, each of which comes with its own set of pros and cons. According to the National Research Council in 2002, approximately 5.6 million tons of sewage sludge are disposed of annually in the United States, with 60 percent of that amount used for

land application.⁸ The basic advantages and disadvantages of each sewage-sludge disposal method are listed in Table 1 (next page).

As for land-applying biosolids, regulations address three main areas of concern for human safety or the environment: pathogens, pollutants, and nutrients. The next few sections will outline the major issues and regulations involved in each of these areas.

What Pathogens May Be Present in Biosolids, and How are They Regulated?

Federal and state regulations require biosolids intended for land application to be treated to reduce **pathogens** (disease-causing organisms). Pathogens may include bacteria, viruses, protozoa, and parasitic worms. In regards to pathogens, biosolids that are intended for land application are to be classified as either Class A or Class B. To be classified as Class A, the biosolids must contain *below-detectable* levels of pathogens. Class B biosolids, on the other hand, contain *detectable* levels of pathogens, and consequently land application of this class requires site restrictions, such as on public access, crop harvesting, or animal grazing. Class A biosolids, on the other hand, may be applied to land without any pathogen-related site restrictions. In order to be spread on land, biosolids must be classified *at least* as Class B, and only biosolids suitable for land application (Class A or B) may be placed into permitted routine storage facilities.

It is also important to note the presence of **vectors** when dealing with pathogens and biosolids. Vectors are agents such as birds, grazing cows, or insects which can carry biosolids (and the pathogens contained therein) away from the application site. Regulations require that precautions be taken to reduce vector attraction to the biosolids site, such as taking steps to lessen odors (which may attract certain vectors), applying the biosolids at only at certain times of the year, or applying the material underneath the soil.

⁴ *Virginia Administrative Code*, “Biosolids Use Regulations,” 12 VAC 5-585-10

⁵ Greg Evanylo, *Land Application of Biosolids for Agricultural Purposes in Virginia* (2003), p. 3.

⁶ Biosolids can be applied either directly on top of the land or incorporated into the soil just beneath the surface.

⁷ Evanylo, *Land Application of Biosolids for Agricultural Purposes in Virginia*, p. 5.

⁸ National Research Council, *Biosolids Applied to Land: Advancing Standards and Practices*, 2002, p. 1.

Table 1. Comparison of Three Main Methods of Sewage Sludge Disposal.

Method of Disposal	Pros	Cons
Landfill	<p>Quick, simple solution compared to incineration and land application.</p> <p>Cost effective compared to incineration and land application.</p> <p>Risk of pathogens low if landfill properly constructed and maintained.</p>	<p>Undergoes anaerobic decomposition which produces methane gas.</p> <p>Chemicals and nutrients can pose a risk to groundwater if landfill is not properly constructed or maintained.</p> <p>Loss of potential benefits of nutrients to crops.</p>
Incineration	<p>Reduces volume (down to 10 to 20 per cent of original volume).</p> <p>Kills pathogens; destroys most organic chemicals.</p>	<p>Trace elements are not destroyed; increases their concentration within the ash five- to ten-fold.</p> <p>Releases carbon dioxide.</p> <p>Expensive compared to landfilling and land application.</p> <p>Ash still has to be landfilled.</p>
Land Application	<p>Increases crop production.</p> <p>Inexpensive fertilizer for farmers.</p> <p>Can reduce soil-acidity levels (if lime-stabilized).</p>	<p>Concerns about odors.</p> <p>Concerns about human health impacts (pathogens and trace elements) and environmental impacts (nutrients).</p> <p>Concerns about human contact through soil, water, or air.</p>

Source: Greg Evanylo, *Land Application of Biosolids for Agricultural Purposes in Virginia* (2003), p. 5.

What Trace Elements May Be in Biosolids?

Trace elements are substances found in very small amounts in land-applied biosolids. The potential presence of trace elements is an environmental concern because there is the potential for pollutants within biosolids to runoff into nearby rivers and streams or leach into groundwater. Current biosolids regulations cover nine trace elements: arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc.

Regulations of trace elements establish **ceiling concentration limits**—that is, the

maximum concentration of these elements allowed within the biosolids (which varies, depending upon the element). In addition to the ceiling concentration limit, there is also a **cumulative pollutant loading rate**: this is the total amount of pollutant that can be applied to a site over time. If any element of those nine is found to have reached the cumulative pollutant loading rate (which also varies by element), biosolids application for that site must stop. Table 2 (next page) lists the limits for each trace element.

Table 2. Regulatory Limits for Trace Elements in Biosolids Applied to Land.

Element	Ceiling Concentration Limit (parts Per million)	Cumulative Pollutant Loading Rate (pounds Per acre)
Arsenic	75	36
Cadmium	85	35
Copper	4300	1340
Lead	840	270
Mercury	57	16
Molybdenum	75	*
Nickel	420	375
Selenium	100	89
Zinc	7500	2500

*A 1994 amendment to the EPA's Part 503 Rule on biosolids deleted the cumulative loading rate limit for molybdenum but retained a ceiling concentration limit.

Source: Greg Evanylo, *Land Application of Biosolids for Agricultural Purposes in Virginia* (2003), p. 8.

How Do Biosolids Regulations Address Nitrogen and Phosphorus?

Nitrogen and phosphorus are essential plant nutrients. Both can create water quality problems if excessive amounts reach water resources, and nitrogen (in the form of nitrate) above a certain level can be harmful in drinking water. Consequently, biosolids regulations seek to prevent excessive movement of these elements into surface waters or groundwater.

Nitrogen can be present in biosolids both in inorganic form (not combined with carbon in a molecule; for example, as nitrate) or in organic form (combined with carbon in a molecule; for example, as an amino acid molecule). Nitrogen in applied biosolids has the potential to contaminate water resources because various forms of nitrogen dissolve in water and can readily move into and through soil (with rates depending on soil type, slope, amount of rainfall, and other factors). Consequently,

regulations require that land-applied biosolids add nitrogen at a rate that will not exceed the amount needed by the crop to be grown on the land receiving the biosolids.⁹

Most biosolids contain similar amounts of both nitrogen and phosphorus, but plants usually require more nitrogen than phosphorus. Phosphorus is less soluble in water than is nitrogen, so it tends to be bound to soil particles and not to be carried by surface or groundwater as readily as nitrogen can be. But according to Greg Evanylo, professor of Crop and Environmental Sciences at Virginia Tech, "There has been considerable research showing that the soil's phosphorus-binding capacity may be exceeded (leading to increased risk of phosphorus runoff) if biosolids are regularly applied at rates designed to supply plants' nitrogen needs."¹⁰

Certain biosolids land-application sites are required to have a **nutrient-management plan**.¹¹ Just as no two biosolids application sites are exactly alike, no two watersheds are exactly alike either, which makes forming a nutrient plan a very individualized process. When working with watersheds, nutrient-plan developers typically must keep in mind the hydrology of the application area, the characteristics of the biosolids being applied, characteristics of the application site (soil type and fertility, pH, precipitation, and intended land use), the nutrient requirements for vegetation on the application site, and other factors.

Buffer Zones

In order to protect against leaching and runoff of pollutants from biosolids, state regulations require buffer zones around wells, bodies of water, human residences, and other features. The buffer zones are the *minimum*

⁹ Evanylo, *Land Application of Biosolids for Agricultural Purposes in Virginia*, p. 18.

¹⁰ Greg Evanylo, Virginia Tech Department of Crop and Soil Environmental Sciences, personal communication, May 2, 2005.

¹¹ Scott Haley, Virginia Department of Health, personal communication, August 3, 2005. According to Mr. Haley, upcoming changes to Virginia regulations will require *all* biosolids-application sites to have nutrient-management plans.

distances that must be maintained between the biosolids application area and the specific features. The current buffer-zone regulations in Virginia are shown in Table 3 below.

Table 3. Standard Buffer Zones (Minimum Distance Away) for Land Application of Biosolids in Virginia.

Feature	Surf. Application*	Incorp. into Soil	During Winter**
Occupied Dwellings	200	200	200
Water Supply Wells or Springs	100	100	100
Property Lines	100	50	100
Perennial Streams and Other Surface Waters (except intermittent streams)	50	35	100
Intermittent Streams/Drainage Ditches	25	25	50
All Improved Roadways	10	5	0
Rock Outcrops and Sinkholes	25	25	25
Agricultural Drainage Ditches (with slopes equal to or less than 2 percent)	10	5	10

*Surface application means *not* incorporated within 48 hours by plowing or discing.

**Winter buffers apply between November 16 and March 15 when the average site slope is greater than 7 percent.

Source: *Virginia Administrative Code*, Section 12VAC5-585-510.

Who Manages Land Application of Biosolids in Virginia?

Biosolids application is managed on a number of different levels. As mentioned before, regulations concerning biosolids are set forth by the EPA in the Part 503 regulation, and the Virginia Department of Health (VDH) regulates biosolids application in Virginia. Virginia regulations are contained in the *Virginia Administrative Code*, specifically Chapter 12VAC5-585, available online (as of August 8, 2005) through the Legislative Information System Web site at leg1.state.va.us/cgi-bin/. While Virginia may prohibit the use of biosolids or set forth more stringent laws than the EPA, *individual counties or cities may not* prohibit the spreading of biosolids, although they may *regulate* its use in certain ways.

Usually biosolids are applied by a third-party contractor who must hold permits issued by the VDH. Those applying for a permit must take a number of things into consideration, such as the following: matching specific land applications to biosolids types; involving stakeholders in biosolids-use planning; and evaluating watershed health concerning run-off.

For sites where a nutrient-management plan is required, the land applicator submits the nutrient plan along with the permit application to VDH. The Virginia Department of Conservation and Recreation (DCR) also examines the plan and makes comments. Often the applicator will have someone on staff who has been certified by DCR to develop a plan.¹²

Once a biosolids-application plan has been approved and is in place, the application area is then monitored by the VDH; sometimes local governments choose to employ their own people to monitor biosolids application as well. The VDH has two employees that deal *only* with biosolids application. On a regional level, other VDH employees throughout Virginia assist with the program when necessary, and local health departments are able to respond to complaints that may arise.

Occasionally, however, wastewater treatment plants apply the biosolids themselves. Virginia wastewater treatment

¹² Scott Haley, personal communication, April 18, 2005.

plants are regulated by the Virginia Department of Environmental Quality (DEQ), so treatment plants wishing to apply the biosolids they generate must get a permit from the DEQ. In such cases, the DEQ regulates the spreading of biosolids for the permits they have issued.¹³

What are Some Outstanding Issues Concerning Biosolids?

While community meetings have often generated much disagreement over land application of biosolids, one thing many people agree about is that more research is needed on various aspects of the practice. This is the message from national studies, state-level efforts in Virginia, and citizen concerns. This section lists the main concerns expressed at these three levels.

National Issues

In 2002, the National Research Council (NRC) published *Biosolids Applied to Land: Advancing Standards and Practices*. The NRC's task in conducting this study was to evaluate "the technical methods and approaches used to establish the chemical and pathogen standards for biosolids, focusing specifically on human health protection and not ecological or agricultural issues" (page 2). In this report (pages 4-5) the NRC identified the following needs:

- improved risk-assessment methods for setting standards for chemicals and pathogens in biosolids;
- a new national survey of chemical and pathogens in sewage sludge, with consideration whether more pollutants (other metals or organic compounds) should be regulated than the nine currently regulated metals;
- a framework for investigating human health concerns and reported impacts on human health; and
- more resources for the U.S. EPA's biosolids program.

Virginia Issues

The Virginia Biosolids Use Regulations Advisory Committee has been advising the

¹³ Scott Haley, personal communication, April 18, 2005.

Virginia Department of Health on possible revisions to state biosolids regulations. The Advisory Committee currently (as of July 2005) is investigating the following issues¹⁴:

- seasonal timing of land applications in order to prevent inefficient use of nitrogen;
- methods to calculate how much phosphorus can be applied with biosolids without endangering surface water quality;
- evaluation of site-specific characteristics—depth of groundwater, presence of karst (carbonate bedrock) features, varying permeability to water, and other factors—that may affect generalized nutrient-management practices.
- distance of biosolids-application sites from residences, schools, and other structures; and
- appropriate safeguards for on-site biosolids storage (e.g., requirement of a cover or liner, allowable storage time).

As noted at the beginning of this article, the 2005 Virginia General Assembly considered nine bills dealing with land application of biosolids (most of the bills used the term "sewage sludge"). Among these bills was **HJ 643**, which directed the Joint Legislative Audit and Review Commission (JLARC) to study land application of biosolids. The JLARC study is to evaluate the following:

- current resources available to the VDH for oversight of the Virginia Biosolids Program;
- resources available to assist local governments with implementing their biosolids inspection and monitoring authority;
- programs to ensure the proper training and support of local biosolids monitors;
- incentives to encourage sharing information and resources among local governments, including the use of regional or multi-jurisdictional monitors; and
- measures to encourage and assist coordination and communication between the VDH and local governments so as to ensure consistency and efficiency in complaint response and enforcement.¹⁵

¹⁴ Greg Evanylo, personal communication, July 1, 2005.

¹⁵ For the full text of this bill, please see the Legislative Information System Web Site at leg1.state.va.us/.

Citizen Concerns

The national and state research and regulatory issues about land application of biosolids are occurring in the context of citizen concerns expressed in public meetings, news articles, comments to legislators, and conversations with scientists. The following lists the major citizen concerns identified from the reading and interviews done for this article.

- Unregulated contaminants, particularly other metals and organic compounds (such as pharmaceuticals), that may reach water resources or enter the food chain.
- The potential for pathogen regrowth in soil or water (not covered by current regulations).
- Human-health and environmental impacts of long-term build-up of metals in soil.
- The adequacy of required distances for land application from water resources, homes, schools, etc.
- The potential for exposure of people near application sites to be exposed to air-borne contaminants.
- The water-quality impact of nutrients, particularly phosphorus, in biosolids.
- Monitoring and enforcement of regulations and local application agreements.

A Final Word

In describing the work of the Virginia Biosolids Use Regulations Advisory Committee, committee member Greg Evanylo of Virginia Tech, referring to the considerable work that the committee has already done, noted, “More to come. No timeframe...for when this process will end.” The same can be said for the entire process of deciding if, when, and under what conditions the land application of biosolids will continue to be an acceptable option for disposing of the solids left over after wastewater treatment.

Katie Moore, a 2005 graduate of Virginia Tech in English, researched and did the primary writing of this article as an intern at the Water Center in Spring 2005.

Water Central thanks Greg Evanylo, of the Virginia Tech Department of Crop and Soil Environmental Sciences, and Scott Haley, of the Virginia Department of Health, for their assistance with this article.

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Draeger, Kathryn J., Michael D. Jorgenson, Patrick J. Mulloy, and Jonathan W. Pundsack. Sustainability International. *Watershed Effects of Biosolids Land Application—Literature Review*. Alexandria, Va.: Water Environment Research Foundation, 1999.

Further Reading on the Internet

U.S. Environmental Protection Agency, “Biosolids,”

www.epa.gov/owm/mtb/biosolids/index.htm.

Along with official documents and other information, this site includes *A Plain English Guide to the EPA Part 503 Biosolids Rule*.

Virginia Department of Environmental Quality, “Frequently Asked Questions and DEQ Responses,”

www.deq.virginia.gov/vpa/pdf/biosolidslandappfaq.pdf.

Virginia Department of Health, “The Biosolids Lifecycle,”

www.biosolids.state.va.us/index.html. This site has information on benefits, concerns, and regulations for biosolids use; a glossary; and links to other sites.

—By Katie Moore and Alan Rafla

VIRGINIA WATER STATUS REPORT

This section of *Water Central* presents recent and historical data on Virginia's precipitation, stream flow, and groundwater levels (one topic per issue, rotating among the three topics).

Precipitation in Virginia, November 2004—July 2005

The chart below shows precipitation (in inches) at seven National Weather Service observation sites in Virginia. The *top number* is the **total precipitation for the indicated site, month, and year**, including the equivalent amount of water contained in any snowfall or other frozen precipitation. These values were found (on 8/3/05) at the "Climate" sections of National Weather Service Web sites, as follows:

<http://www.erh.noaa.gov/er/rnk/>, for Blacksburg, Lynchburg, and Roanoke (click on "Past Weather and Outlooks," then "Daily Climate Observations"); www.erh.noaa.gov/er/lwx/climate.htm, for Charlottesville and Washington-Dulles; and www.erh.noaa.gov/er/akq/climate/climate.htm, for Norfolk and Richmond. The *bottom number (in parenthesis)* is the **average precipitation for that month** over the period 1971—2000, according to the National Climatic Data Center, *Climatology of the United States No. 81* (accessed at www5.ncdc.noaa.gov/climate_normals/clim81/VAnorm.pdf on 8/9/04; access to this Web address now requires a user ID and a password). The monthly amounts shown here are classified as "preliminary data" by the National Weather Service; the National Climatic Data Center maintains any edited and certified data that are available.

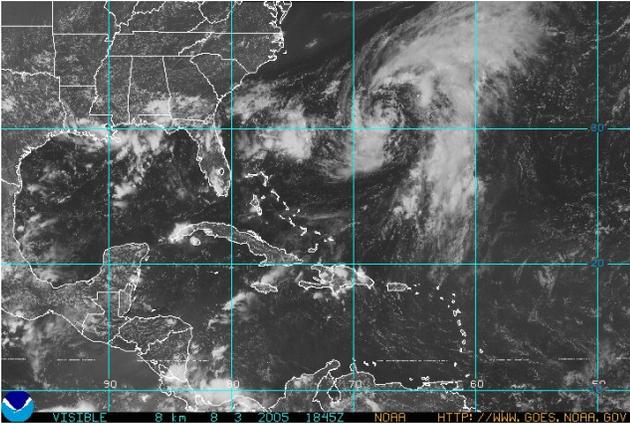
Water Central's most recent previous report on Virginia precipitation (for January—October 2004) appeared in the November 2004 issue (issue #32).

More Virginia climate data and the *Virginia Climate Advisory* are available from the Virginia State Climatology Office, online at <http://climate.virginia.edu>. To reach the State Climatologist's office, phone (434) 924-0548 or send e-mail to pjm8x@virginia.edu.

	Blacks- burg (Station #012)	Charlottes- ville (Station #023)	Lynchburg (Municipal Airport)	Norfolk (Internat. Airport)	Richmond (Byrd Intern. Airport)	Roanoke (Woodrum Airport)	Wash.- Dulles Airport
Nov. 2004	4.71 (2.96)	4.85 (3.74)	5.14 (3.18)	2.66 (2.98)	3.27 (3.06)	4.26 (3.21)	4.11 (3.31)
Dec. 2004	1.88 (2.87)	2.74 (3.26)	2.41 (3.23)	2.41 (3.03)	2.37 (3.12)	2.13 (2.86)	3.01 (3.07)
Jan. 2005	2.71 (3.37)	4.01 (3.71)	3.73 (3.54)	2.48 (3.93)	3.42 (3.55)	2.15 (3.23)	3.14 (3.05)
Feb. 2005	2.24 (3.02)	1.65 (3.30)	1.79 (3.10)	2.32 (3.34)	1.39 (2.98)	2.20 (3.08)	1.41 (2.77)
Mar. 2005	4.17 (3.83)	3.74 (4.05)	3.51 (3.83)	2.25 (4.08)	3.99 (4.09)	3.72 (3.84)	3.93 (3.55)
Apr. 2005	2.52 (3.83)	3.38 (3.34)	2.25 (3.46)	2.74 (3.38)	2.05 (3.18)	2.63 (3.61)	4.34 (3.22)
May 2005	1.63 (4.39)	2.48 (4.86)	2.12 (4.11)	4.02 (3.74)	4.22 (3.96)	2.16 (4.24)	4.86 (4.22)
June 2005	4.30 (3.93)	1.95 (4.46)	3.33 (3.79)	4.50 (3.77)	1.19 (3.54)	5.07 (3.68)	1.92 (4.07)
July 2005	5.52 (4.17)	4.43 (4.94)	4.31 (4.39)	3.67 (5.17)	9.28 (4.67)	4.96 (4.00)	7.89 (3.57)
Total for period	29.68 (32.37)	29.23 (35.66)	28.59 (32.63)	27.05 (33.42)	31.18 (32.15)	29.28 (31.75)	34.61 (30.83)

SPECIAL WEATHER FEATURE

Time to *Stay Ready* for Hurricanes



Tropical Storm Harvey, August 3, 2005, 2:45 p.m., approximately 195 miles west-southwest of Bermuda. Photo taken from NOAA Web page at <http://www.goes.noaa.gov/> on August 3.

The Atlantic hurricane season runs from June 1 to November 30. The busiest part of the season typically is August through October.

On August 2, 2005, the National Oceanic and Atmospheric Administration (NOAA) released its updated outlook for the 2005 Atlantic hurricane season.¹⁶ In that news release, NOAA claimed there was a 95—100 percent chance of an *above-normal* 2005 Atlantic hurricane season. This assessment was the consensus of scientists at NOAA's Climate Prediction Center, Hurricane Research Division, and National Hurricane Center.

The updated outlook predicts a seasonal total of 18 to 21 tropical storms (the annual average is 10), with 9 to 11 hurricanes (average is 6), and 5 to 7 major hurricanes (average is 2 to 3). These numbers are for the *entire season* and so include the 7 tropical storms and 2 major hurricanes that occurred before August 2 (the early part of the 2005 season was unusually active).

The NOAA update included the following strong warning (*italics added*): “*Given the forecast that the remainder of the season will be very active, it is imperative that residents and government officials in hurricane-vulnerable communities have a hurricane preparedness plan in place.*”

¹⁶ The full text of the outlook is available online at www.cpc.ncep.noaa.gov/products/outlooks/hurricane.html (as of 8/3/05).

This rest of this section presents a hurricane-preparedness quiz, followed by hurricane safety and preparedness tips from the Virginia Department of Emergency Management.

Hurricane Preparedness Quiz

The Virginia Department of Emergency Management provided this true/false quiz. (It has been slightly edited here for space.)

1. Your family disaster plan should include a phone number for an out-of-state friend or family member. T / F
2. Candles are the best source of light during a power outage. T / F
3. Most deaths that results from a hurricane happen during the height of the storm. T / F
4. It takes as little as two feet of water to carry away most vehicles. T / F
5. Pets are welcome at emergency shelters. T / F
6. Most homeowners' insurance policies cover flood damage. T / F
7. Virginians need be concerned only about hurricanes that make *landfall* in Virginia. T / F
8. Tropical storms or depressions can cause more damage than hurricanes. T / F

Quiz Answers

1. *True.* During an emergency, long-distance phone lines are more likely to be operational. Local phone lines could be affected by the disaster, and cell phone relay towers might be overloaded. The purpose of an out-of-state contact is for each member of the family to check in and let loved ones know where they are.
2. *False.* Candles pose a fire hazard and should not be used during an emergency, especially if there is a chance that a gas line is broken. Instead, use a flashlight and keep extra batteries.
3. *False.* Most deaths occur *after* the hurricane, during the clean-up phase, when failure to follow proper safety procedures can lead to chainsaw accidents, falls from roofs, or carbon monoxide deaths from improperly ventilated generators.
4. *True.* Very little moving water is needed to move vehicles. Moreover, what looks like shallow water can mask a deep hole where the road has been washed away.
5. *False.* Due to health regulations, only *service animals* are permitted in emergency shelters. Contact animal hospitals or kennels outside your

evacuation area that will care for animals during an emergency. If you want to stay with your pet, contact hotels to find ones that accept pets.

6. *False*. Most homeowners' policies do not cover flood damage. If you live in an area that can flood, contact a licensed insurance agent about flood coverage.

7. *False*. Some of the worst storms in Virginia history made landfall in other states; for example, Isabel in 2003 landed in North Carolina.

8. *True*. Tropical storms and depressions can be just as damaging or deadly as hurricanes. For example, Hurricane Gaston in 2004 had weakened to a tropical depression when it moved through central Virginia, but its heavy rain caused record flooding, nine deaths, and major property damage.

VDEM's Hurricane Safety and Preparedness Tips

The following text was taken from the Virginia Department of Emergency Management's (VDEM) "Hurricane Preparedness" Web page, <http://www.vdem.state.va.us/05hurr/>, on August 3, 2005. Much more information on hurricanes and other emergencies is available at the VDEM site.

Before the Storm

- Know your risk. Find out if your home is in the storm surge or flooding zone. Consult your area emergency management office for this information.
- Identify where to go if you are told to evacuate and the safest route to get there. Choose several places – a friend's home in another town, a motel, or a shelter. Remember, public shelters and many motels don't allow pets in their facilities.
- Get ready for a possible power outage by gathering a minimum one-week supply of foods that don't require refrigeration or cooking, such as canned goods, as well as bottled water, flashlights with extra batteries, a first-aid kit, and battery-powered radio. If you need to evacuate, make sure you can consolidate these items into a portable "go" kit, like a backpack or duffel bag.
- Purchase a NOAA Weather Radio for National Weather Service reports, watches, and warnings.
- Re-check your supply of plywood, tools, batteries, tarps, and plastic sheeting for roof repairs.
- Cut dead trees and limbs that could fall on your home.
- Consider retrofitting your garage door by installing horizontal bracing onto each door panel. High winds that enter through the garage can blow out doors, windows, walls, and even the roof.
- Make sure you have a current flood insurance policy (not typically part of a homeowner's policy).

A 30-day waiting period is generally required to purchase flood insurance, so take time now to visit your insurance agent to learn more.

- Take pictures of your property before the storm to help validate your claim and remember to take your policies with you if you need to evacuate.

When a Hurricane is Approaching

- Listen to your local radio and TV stations for updated storm information. A hurricane *watch* means possible danger. If the danger increases, a hurricane *warning* will be issued.
- If you have space in your refrigerator or freezer, consider filling plastic containers with water, leaving about an inch of space inside each one. (Remember, water expands as it freezes, so it is important to leave room in the container for the expanded water.) Place the containers in the refrigerator or freezer. This chilled or frozen water will help keep food cold for several hours if the power goes out.
- Fill your bathtub with water to use for toilet flushing in case water services are unavailable following the storm.
- Bring in garbage cans, lawn furniture, and other items that could blow away.
- Fill your car's gas tank and prepare to evacuate if told to do so.

During the Storm

- If you are not advised to evacuate, remain indoors and away from windows. If necessary, seek refuge in an interior, windowless room. Cover yourself with pillows or a blanket for protection from falling debris.

After the Storm

- Listen to your local radio stations for official disaster relief information and instructions.
- Prepare to be without power, telephone, or any outside services for a week or more.
- Watch out for downed power lines, weakened structures, rodents, and snakes, and avoid standing water.
- Avoid drinking tap water unless officials say it is safe. Eat only foods you know to be safe.
- Be extra careful when handling power tools, gas lanterns, and matches.
- Operate generators outdoors only in a well-ventilated, dry area, away from air intakes to the home. Never use a generator indoors or in attached garages. Poor ventilation can result in carbon monoxide poisoning or death.
- Avoid using candles as a light source. Deadly fires can result.

IN AND OUT OF THE NEWS

Newsworthy Items You May Have Missed

The following summaries are based on information in the source(s) indicated in parentheses, usually at the end of each item. Selection of this issue's items ended in early August 2005. Except as otherwise noted, the localities mentioned are in Virginia and the dates are in 2005.

In Virginia...

•At its June 28 meeting, the **State Water Control Board (SWCB)** adopted a **regulation establishing a local and regional water-supply planning process** and setting criteria for local and regional plans. The regulation is part of the requirements of SB1221, passed by the Virginia General Assembly in 2003. The new regulation requires each local government to submit to the SWCB a local water-supply plan or to participate in a regional plan; plans are due within three to five years, depending on a locality's population. The regulation also details the information that local plans should include; requires plans to address conservation and drought response; requires contingency plans; and requires a statement of need based on existing sources and projected demands at least 30 years into the future. The Department of Environmental Quality (DEQ) has a new planning-assistance grant program to help defray local planning costs, expected to be \$4.5–6.5 million statewide. Following SWCB approval, a local plan will become part of the State Water Resources Plan, still being developed by the DEQ. The state plan will promote regional water-supply solutions, inform potential users of available water supplies, and identify water-use conflicts.

At the June 28 meeting, the SWCB also adopted a regulation to set a numeric limit on the **level of chlorophyll a** (a measure of water quality) in the James River, but delayed its effective date to allow for more public comment. The SWCB took the same action on regulations to establish **wastewater-discharge limits on nutrients** (nitrogen and phosphorus) and to establish **nutrient-load allocations** for each of the Chesapeake Bay's main tributaries. (Agenda and minutes of the SWCB's 6/28/05 meeting; and Virginia Municipal League's *Update*, 7/15/05)

•The SWCB regulation on local water-supply will be of considerable interest to **localities currently examining their water-supply options**. Here are a few recent situations:

••**Charlottesville and Albemarle County**, facing a possible 9.9-million gallon per day (MGD)

deficit by 2055, are considering several options: dredging or raising the dam at one existing reservoir; raising the pool of another reservoir; or piping water from the James River.

(*Charlottesville Daily Progress*, 2/13/05)

••**Suffolk**, with the second-fastest rate of growth among Virginia's cities, recently received permission from the DEQ to double its groundwater use, up to an additional 4.6 MGD. The increase is projected to meet demands through 2013. (*Virginian-Pilot*, 5/6/05)

••**Appomattox County and the Town of Appomattox** are considering a joint project to add significantly more water-supply capacity for the area; currently the town's wells are the only source. Options under consideration include a new water line to Concord in neighboring Campbell County, a new line to Lynchburg, a new line to the James River on the county's northern border, or a new reservoir. (*Appomattox Times-Virginian*, 5/20/05)

••**Louisa County** is looking for options to supply a new 1,200-home subdivision at Zion Crossroads, on its southern border with Fluvanna County. For the long term, the two counties have an agreement to pipe water from the James River to the community. But because the James River project is a long time off, Louisa County is examining other options within its borders, such as drilling new wells near the community, drawing water from a northern Louisa lake, or drawing water from a central Louisa reservoir. (*Charlottesville Daily Progress*, 5/31/05)



•**Chemical spills and fish kills** made news several times recently in Virginia waterways.

••In April, about 6,800 fish were found dead in **Mason Creek (Roanoke River watershed)** in Salem, following an April 20 spill of 1,400 gallons of floor and drain cleaner from a local industry. (*Roanoke Times*, 4.28/05)

••On May 4, hundreds of dead fish were discovered in **Pohick Creek (Potomac River watershed)** on Fairfax County Park Authority property in Springfield. A DEQ investigation identified the likely cause as a nearby swimming pool that had recently been drained and cleaned. (*Fairfax Station Connection*, 5/18/05)

••On May 8, a barge ran aground in the **James River in Henrico County** and leaked an estimated 2,000 gallons of fuel oil. Soon after the spill, VDGIF officials said there had been no fish kills or other visible signs of environmental damage. (*Richmond Times-Dispatch*, 5/10/05)

••On May 15, a tractor-trailer crash in Giles County killed the truck driver and resulted in a spill of lime into **Big Stony Creek (New River watershed)**. The spill killed over 5,000 fish, plus other organisms. (*Roanoke Times*, 5/20/05)

••On May 22, a tanker truck overturned in Abingdon and spilled about 5,000 gallons of diesel fuel into **Wolf Creek (Holston/Tennessee River watershed)**. Impacts to the creek were unknown at the time of the news article. (*Bristol Herald-Courier*, 5/23/05)

••Since 2004, an estimated 80 percent of *adult* Smallmouth Bass and Redbreast Sunfish in the **Shenandoah River** have died, according to a VDGIF fisheries biologist in July. The problem appeared in the North Fork of the Shenandoah in 2004 and the South Fork this year. The dead fish typically have lesions that become infected with common bacteria. As of late July, state officials had not identified a definite cause but suspected that nonpoint source pollution (surface runoff) was a factor. (Associated Press, 6/25/05; and *Richmond Times-Dispatch*, 7/20/05)

•More bad fish news: On July 27 the Virginia Department of Health (VDH) issued a **new fish-consumption advisory, and modified several existing advisories**, due to recent test results indicating high levels of **mercury and polychlorinated biphenyls (PCBs)**. The *new advisory* is for Creek Chub in Indian Run in Fairfax County. The *modified PCB advisories*, affecting various fish species, are for Bull Run in Fairfax and Prince William counties and Manassas Park City; the Blackwater River, Roanoke River, and Smith Mountain Lake in Bedford, Franklin, Pittsylvania, and Roanoke

counties; Beaver Creek in Washington County and Bristol City; and Knox Creek in Buchanan County. The *modified mercury advisories*, also affecting various species, are for the Blackwater River in Isle of Wight, Surry, and Southampton counties and Franklin and Suffolk cities; Great Dismal Swamp Canal, Lake Drummond, and the Feeder Ditch in Chesapeake and Suffolk cities; and Dragon Run Swamp and the Piankatank River in Essex, Gloucester, King and Queen, and Middlesex counties. More information on these advisories is on the VDH Web site at www.vdh.virginia.gov/hhcontrol/fishingadvisories.asp.

•But here's some good fish news: In 2004, Virginia's freshwater anglers caught **over 6,700 "citation" fish**—that is, fish meeting length or weight criteria established by the VDGIF. The top six species earning the most citations were Blue Catfish, Rainbow Trout, Largemouth Bass, Yellow Perch, and Crappie and Rock Bass (tied for fifth). The top five waters producing citation fish were private ponds, James River, Buggs Island Lake, Lake Moomaw, and Chickahominy Lake and River. (*Roanoke Times*, 4.8/05)

•On June 17, over **1000 freshwater mussels were released into the Clinch River** near Cedar Bluff in Tazewell County. The mussels were from seven species and ranged in age from two weeks to 25 years. The release was part of a seven-year effort to restore mussel populations destroyed by a 1998 chemical spill. Over 50 mussel species naturally inhabit the area, but 32 species are listed as endangered or threatened. (VDGIF Press Release, 6/10/05)



•In April, Virginia and other Mid-Atlantic states, along with federal agencies and other groups, formed the **Mid-Atlantic Regional Panel on Aquatic Nuisance Species**. Some *non-native species*, coming into an environment lacking the population controls found in their native habitats, can reproduce so prolifically that they cover or damage human structures, or take over habitats and displace native species. Zebra Mussels are a well-known example of a non-native nuisance aquatic species. The new regional group seeks to coordinate state efforts; help secure federal funding; improve monitoring to find new species; develop plans to respond quickly to new threats; and develop strategies for managing existing problems. (*Bay Journal*, May 2005)

Meanwhile, several bills addressing non-native invasive aquatic species were introduced in Congress this year. As of August 10, all these bills were still in their respective committees.



••**S.363**, the Ballast Water Management Act of 2005, would establish standards for ocean-going vessels to treat and manage their ballast water (ballast water is an important way that non-native species are brought to U.S. waters).

••**S.770** (companion House bill is H.R.1591), the National Aquatic Invasive Species Act of 2005 (reauthorizing a 1990 bill by the same name), would establish a national ballast-water management plan, support various other responses to the issue, and provide some funding for invasive species control and research.

••**H.R.1592**, the Aquatic Invasive Species Research Act, would establish and fund several research, development, demonstration, and education programs to support prevention and control of aquatic invasive species.

••**H.R. 1593** (companion Senate bill is S.507), the National Invasive Species Council Act, would give this Council responsibility for coordinating

invasive species activities (for both aquatic and terrestrial species) of over 20 federal agencies.

(Inside EPA's *Water Policy Report*, 3/7/05; Va. Dept. of Conservation and Recreation e-mail communication, 4/2/505; and the Library of Congress' legislative information Web site, thomas.loc.gov, 8/10/05)

•In April a federal jury convicted a **Bedford County mobile-home-park owner** for violations of the Clean Water Act. The jury found the defendant guilty of illegally operating the park's sewage lagoon and allowing discharges to pollute a creek in the 105-home park. Sentencing was due in August. (*Roanoke Times*, 4/29/05. For a previous item, please see the January 2005 *Water Central*, p. 11.)

•**Landfills and actual or potential groundwater contamination** continue to make news in many Virginia localities. (For a previous item, please see the April 2004 *Water Central*, p. 16.) Here are some recent situations.

••Between March and May, 22 residential wells in the Broad Run Farms subdivision in **Loudoun County** were found to contain trichloroethylene (TCE), a toxic substance used in degreasing metal. Some wells in the subdivision were contaminated with TCE as early as 1989. The Va. DEQ and the U.S. EPA were investigating to determine whether the source was the Hidden Lane Landfill, a facility that operated in the 1970s and 1980s. In May, a local civic association said that it planned to petition the EPA to declare the area a federal Superfund site. (*The Connection Newspapers*, 5/11 and 5/19/05; and *Leesburg Today*, 5/19/05)

••In April, the owners of a mobile/modular home park sued **Campbell County** for \$10 million in compensation for groundwater contamination caused by a county landfill. The landfill operated from the late 1970s to 1994. The plaintiffs and the county have tried since 2002 to agree on a clean-up plan. As of April, the county had submitted a corrective action plan to the DEQ and was awaiting the agency's response. (*Lynchburg News & Advance*, 4/23/05)

••In July, **Orange County** public works officials were seeking DEQ approval for to allow two more monitoring wells on the county landfill site. The new wells are needed to test whether solvents found in groundwater on the landfill site in 2000 are spreading to other properties and potentially contaminating drinking water. Opened in 1973, the Orange facility is a "medium-risk" landfill and is allowed to continue operating as long as it doesn't expand horizontally. All

medium-risk landfills must close by 2012, though. (*Charlottesville Daily Progress*, 7/12/05)

- Also in July, **Floyd County** supervisors were told by a consultant that they may ultimately face a legal confrontation with the DEQ over proposed corrective plans for the county landfill. Organic chemicals were detected in groundwater near the landfill in 2004. The DEQ is seeking more monitoring wells and more frequent testing than the county has proposed. (*The Floyd Press*, 7/14/05)

- Finally, the **City of Chesapeake** is trying to stop a large new landfill proposed for its North Carolina neighbor Camden County. The facility, being proposed by the Black Bear Disposal company (a subsidiary of Waste Industries USA of Raleigh, N.C.), would be 490 acres—the largest in North Carolina—and would be located one-half mile from the Chesapeake city line. It would receive up to 10,000 tons of trash per day from as many as 20 states. Chesapeake officials are worried that the proposed landfill would threaten the Northwest River watershed, which provides 60 percent of the city's drinking water; the City also has expressed concern about increased traffic. In July, Chesapeake hired a law firm to help convince the EPA that North Carolina did not conduct an adequate review of the project. (*Virginian-Pilot*, 6/13 and 7/20/05)

- In May, the former **Avtex Fibers factory site along the Shenandoah River** in Front Royal had a grand opening as a mixed-use development project. The state shut down the plant in 1989 due to repeated water- and air-pollution violations. The site was placed on the national Superfund list and the U.S. EPA has overseen its cleanup since then. Now, 31 acres will be called Royal Phoenix and will be home to technology businesses, a wine and culinary center, and a hotel/conference center. Another 30 acres will open as a soccer-field complex in 2006. Most of the remainder of the 440-acre site is to be set aside as a nature conservancy when the EPA completes the cleanup in 2009. (*Richmond Times-Dispatch*, 5/9/05)

- The **estimated cost to clean up Virginia's impaired waters is \$12.5 billion**. The estimate applies to about 6,900 stream miles and 1,810 square miles of estuaries (including most of the Chesapeake Bay) that are currently listed as *impaired*—that is, not meeting water-quality standards. About \$7 billion of the total is needed for the state's share of the Chesapeake Bay cleanup. Assistant Secretary of Natural Resources Russ Baxter gave those estimates—

which he called a “ballpark figure” that could change—on May 12 to a General Assembly committee studying ways to finance the needed water-quality improvements. (*Richmond Times-Dispatch*, 5/13/05)

- After **five drownings in the Potomac River in 2004**, several federal, state, and local agencies with jurisdiction along the river began meeting to look for factors leading to the tragedies and ways to help prevent further ones. In June, the officials announced several steps. One is posting 25 warning signs—in English, Spanish, and Vietnamese—cautioning against swimming or wading in the Potomac Gorge, a turbulent, 14-mile stretch of river upstream of Washington that draws thousands of visitors each year. A second step is to coordinate data on drownings and near-drownings to give a more accurate picture of danger spots. Third, in an emergency the agencies will use a National Park Service facility in Hagerstown as an information center. Finally, the agencies agreed to look for other ways to coordinate their efforts before, during, and after emergencies. (*Washington Post*, 6/9/05)

- Effective January 1, 2006, **licenses and permits for commercial and recreational fishing, shellfishing, and boating** in Virginia's coastal waters will **increase for the first in at least 10 years**, some by as much as 67 percent. The Virginia Marine Resources Commission (VMRC) approved the increases at its July 26 meeting. The fees support commercial and recreational fishing projects and initiatives, based on decisions by citizen boards and oversight by the VMRC. (*Virginian-Pilot*, 7/27/05)

- Here are some **Chesapeake Bay items**:

- Ready for some **Clean the Bay Day** numbers? On June 11, over 4,500 volunteers at about 200 sites covering almost 240 miles of Virginia stream, river, and Bay shoreline collected about 149,000 pounds of debris. The 2006 event will be on June 10. (Chesapeake Bay Foundation, www.cbf.org, 6/30/05)

- On June 13, the U.S. EPA **rejected most of the Chesapeake Bay Foundation's December 2003 petition** for stricter nutrient regulations in the Bay watershed. The EPA assistant administrator for water, Benjamin Grumbles, said EPA chose to continue working with *ongoing state efforts*, rather than seek to issue new federal regulations. Those state efforts include Virginia's expected new nutrient standards and discharge limits (see the SWCB item at the beginning of this section) and its new

nutrient-credit exchange program established by HB 2862 in the 2005 General Assembly. The EPA did agree to two Bay Foundation requests, for greater oversight of state permits and for re-examining individual states' progress.

(*Washington Times*, 6/14/05.)

••On June 27, the Maryland Department of Natural Resources announced that it would **study for six additional months the possible impacts of introducing non-native oysters** into the Chesapeake Bay. Results from a National Oceanic and Atmospheric Administration (NOAA) study are due this fall. (*Baltimore Sun*, 6/28/05. For the latest of several previous items, please see the April 2005 *Water Central*, p. 20.)

••For 30 days in June and July, **16 high school students kayaked 355 miles from the Shenandoah Valley to the Chesapeake Bay**. The students from Turner Ashby High School (Rockingham County) were led by their high school agriculture teacher. Along the way they learned about the Bay watershed's resources, places, people, and problems; met local residents and public officials; and published their journal entries and photos on a Web site, www.baybound.org. (*Virginian-Pilot*, 7/21/05)

...and Outside of Virginia

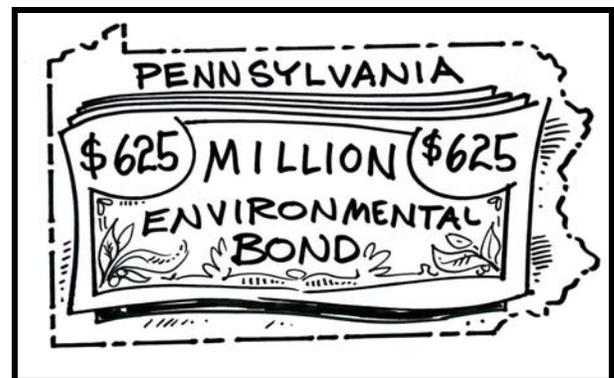
•The **Second National Water Policy Dialogue**, held February 14–15 in Tucson and attended by over 250 water resources experts, generated a list of national water-policy needs. In March, the American Water Resources Association (AWRA) sent letters describing these needs to President Bush, key Congressional leaders, and the 50 state governors. The identified needs include focusing attention on watershed-level issues (as opposed to single projects); creating a more integrated, less *ad-hoc* set of water-policy goals; more effectively coordinating federal, state, tribal, and local government programs; using the nation's scientific capability to support better decision making; and educating public officials and citizens about water-resource challenges and the need for water-infrastructure funding. Information on the Dialogue is available online at www.awra.org/meetings/Tucson2005/. (AWRA Press Release, 3/28/05)

•On February 28, the U.S. Court of Appeals for the 2nd Circuit, in *Waterkeeper Alliance Inc., et al. v. EPA*, ruled that the **EPA's confined animal feeding operation (CAFO) regulation** improperly required such operations to acquire wastewater discharge permits for *potential*

pollutant discharges, not just *actual* discharges. The court said that there is “no statutory obligation to seek or obtain a [discharge] permit” if there is no “actual addition of any pollutant.” This part of the complicated ruling could have implications for federal stormwater requirements at industrial and construction sites. (Inside EPA's *Water Policy Report*, 3/7/05)

•Along with the enormous and tragic death toll caused by the **December 2004 tsunami in the Indian Ocean**, experts say the **ecological consequences will be significant and long-lasting**, with perhaps decades needed before the full impacts are understood. Some of the expected impacts are damage to mangrove forests that provide aquatic nurseries and buffer coastlines; damage by waterborne debris to coral reefs, fish, and wetlands; and altered tidal water exchange in wetlands, due to elevation changes. (*National Wetlands Newsletter*, Mar.-Apr. 2005)

•On May 17, Pennsylvania voters approved a **\$625 bond measure** to fund watershed protection, open space preservation, abandoned mineland reclamation, and acid-mine-drainage remediation. Sixty-one percent of those voting approved the “Growing Greener II” measure, first proposed by Gov. Ed Rendell in February 2004 and approved by the state assembly in April 2005. *Specific* projects to be funded are yet to be determined through negotiations between the governor and the legislature. (*Pittsburgh Post-Gazette*, 4/13/05; and *Bay Journal*, June 2005)



A Final Word

•“It brings tears to your eyes. You’ll see a lot of smiles on children’s faces that don’t have to carry water from one place to another anymore. I think they’ll jump for joy.”—Lillian Tillman, a resident of Dawn (Caroline County), where construction of a project to bring water and sewer to about 400 rural homes is set to begin in October. (*Fredericksburg Free Lance-Star*, 4/16/05)

N O T I C E S

Recent State Water Meetings

This section presents a list of most water-related public meetings and hearings that occurred between March 25 and August 3, 2005, as listed on the **Virginia Regulatory Town Hall** Web site, at www.townhall.state.va.us/Intro.cfm. The Town Hall site posts minutes of public meetings by all of Virginia's boards, commissions, and departments. The list below includes the name of a contact person for further information. To find the e-mail address or phone number of the contact people, go to the Regulatory Town Hall Web site, click on Meetings (Future or Past), and then click on the particular event. You can also request state employee phone numbers by calling (800) 422-2319, and you can find the e-mail address of any state employee online at www.employees.state.va.us/directory-search.cfm.

If you would like to receive a weekly e-mail notification about *upcoming meetings related to water quality*, you may do so by joining the Virginia Water Monitoring Council. Contact Jane Walker at (540) 231-4159 or janewalk@vt.edu.

Total Maximum Daily Load (TMDL) Meetings

TMDL-related meetings were held regarding the following waters and water-quality impairment issues. The contact people listed for TMDLs are all Virginia Department of Environmental Quality staffers. Information on the status of all TMDLs in Virginia is available online at <http://www.deq.state.va.us/tmdl>.

Accomack County: Onancock Creek for dissolved oxygen. More information: Jennifer Howell.

Bedford and Campbell counties: Elk Creek, Machine Creek, Sheep Creek, Little Otter River, and Lower Big Otter River. More information: Theresa Carter.

Buchanan County: Knox Creek and Pawpaw Creek for bacteria. More information: Nancy Norton.

Carroll and Grayson counties and Galax City: Chestnut Creek for bacteria. More information: Nancy Norton.

Cumberland County: Willis River for bacteria. More information: Jason Ericson.

Dinwiddie, Lunenburg, Nottoway, and Prince Edward counties: Upper Nottoway River for multiple impairments. More information: Kelly Wills.

Fauquier County: Carter, Deep, Great, and Thumb runs for bacteria. More information: Kimberly Davis.

Frederick County and Winchester City: Abrams Creek and Opequon Creek for bacteria. More information: Robert Brent.

Gloucester County: Sixteen shellfish waters for bacteria. More information: Chester Bigelow.

Louisa, Orange, and Spotsylvania counties: Beaver Creek, Goldmine Creek, Mountain Run, Pamunkey Creek, Plentiful Creek, and Terrys Run, all for bacteria (meeting also held in June). More information: Kimberly Davis.

Madison County: Robinson River and Little Dark Run for bacteria. More information: Kimberly Davis.

Mathews County: Seven shellfish waters for bacteria. More information: Chester Bigelow.

Middlesex County: Shellfish waters for bacteria. More information: Chester Bigelow.

Montgomery County: Stroubles Creek for benthic impairment. More information: Jason Hill.

Orange County: Mountain Run and Mine Run for bacteria. More information: Kimberly Davis.

Poquoson City and York County: Shellfish waters for bacteria. More information: Chester Bigelow.

Rockingham County: Beaver Creek for bacteria. More information: Robert Brent.

Scott County: Stock Creek. More information: Nancy Norton.

Shenandoah County: Mill Creek for benthic impairment; North Fork Shenandoah River for bacteria (also in Rockingham County); and Stony Creek for bacteria. More information: Robert Brent.

Smyth and Washington counties: North Fork Holston River. More information: Nancy Norton.

Southampton and Sussex counties: Raccoon Creek and Blackwater River for multiple impairments. More information: Chris French.

Stafford County: Deep Run for bacteria. More information: Kimberly Davis.

Tazewell County: Laurel Fork for bacteria and low dissolved oxygen. More information: Nancy Norton.

Other State Meetings and Hearings

3/31, Glen Allen; and 4/5 in Roanoke: SWCB public meetings on the notice of intent to amend water quality standards regulation to address **nutrient criteria for lakes**. More

information: Jean Gregory. On May 4, June 8, and July 7, the SWCB's *advisory committee* on this topic met. More information on the advisory committee: Elleanore Daub.

4/4 and 4/27, Richmond; and 5/13, 6/21, and 7/14, Glen Allen: Meetings of the advisory committee assisting the DEQ in developing **amendments to the Virginia Water Protection Permit regulation**. More information: William Norris.

4/8, 4/28, and 5/24, Glen Allen: Meetings of the **stream mitigation workgroup**, to advise the DEQ in developing guidance for assessing stream impacts and compensation requirements related to impacts permitted under the Virginia Water Protection Permit Program. More information: Catherine Harold.

4/27, Glen Allen: Meeting of the advisory committee assisting in developing regulatory language on **general VPDES permits for car wash facilities**. More information: George Cosby.

5/4, Richmond: Meeting of the SWCB's advisory committee assisting in developing amendments to the **general discharge permit for ready-mixed concrete facilities**. More information: Burt Tuxford.

5/4 through 5/17, statewide at DEQ regional offices: SWCB public hearings on the proposed regulation for **local and regional water supply planning** (9 VAC 25-780). More information: Scott Kudlas.

5/3, 5/5, and 5/6, Glen Allen: Meetings of the DEQ's **Peer Review Team for the Virginia Water Protection Permit (VWP) Program**. More information: Kathy Frahm.

5/16, Woodbridge: Meeting of the **Recycling Rate Subcommittee** on the recycling rate reporting program, recycling calculation methodology, and the existing 25-percent recycling rate mandate for local governments. More information: Michael P. Murphy.

5/17, Glen Allen: Meeting of the advisory committee established to assist in the development of a **general discharge permit for coin-operated laundries**. More information: George Cosby.

5/18, Richmond: Meeting of the Soil and Water Conservation Board's Ad Hoc Study Committee on **agricultural program delivery by soil and water conservation districts**. More information: David Dowling.

5/24, Lynchburg: SWCB public meeting on the notice of intent to consider designating certain tributaries of the Pedlar River and North Fork of the Buffalo River, and a portion of the North

Fork of the Buffalo River, as **exceptional state waters**. More information: David Whitehurst.

5/25, Glen Allen: SWCB public meeting to receive comments on the notice of intent to establish a general permit for **point-source discharges of nitrogen and phosphorus** to the Chesapeake Bay Watershed and a **nutrient-trading mechanism**. Also, the SWCB *advisory committee* on this topic met June 20 and July 25. More information: Allan Brockenbrough.

6/6—6/13, various locations: DCR public hearings on proposed amendments to **Nutrient Management Training and Certification Regulations**. More information: David Dowling.

6/6, Harrisonburg, and 6/8, Roanoke: SWCB public hearing on amendments to the **Water Quality Management Planning Regulation**. More information: Charles Martin.

6/9, Glen Allen: SWCB public hearing on amendment to regulations for **domestic sewage discharges of 1000 gallons per day or less**. More information: Burton Tuxford.

Regular Meetings of Statewide Boards and Commissions

Chesapeake Bay Local Assistance Board: Meets March, June, September, and December. The Board's Northern and Southern Area Review Committees, which review compliance by local Bay Preservation Area programs, meet in February, May, August, and October. More information: David Dowling.

Groundwater Protection Steering Committee: Meets third Tuesday of odd-numbered months. More information: Mary Ann Massie.

Marine Resources Commission: Meets monthly. More information: Jane McCroskey.

Soil and Water Conservation Board: Meets bimonthly. More information: David Dowling.

State Water Control Board (SWCB): Meets March, June, September, and December. More information: Cindy Berndt.

Waste Management Board: Meets about three times per year. More information: Cindy Berndt.

Waterworks and Wastewater Works Operators Board: Meets March, June, September, and December. More information: David E. Dick.

New Publication on Drought

Drought and Water Crises: Science, Technology, and Management Issues, published in 2005, compiles research reports from scientists and engineers on how society can use science, technology, and management to reduce

drought vulnerability. The book is available for sale from CRC Press, Boca Raton, Fla., at (800) 272-7737, orders@crcpress.com; Web site: www.crcpress.com.

Virginia Water Science Center

The U.S. Geological Survey (USGS) Virginia District is now called the USGS Virginia Water Science Center. The Center's office remains at 1730 East Parham Road, Richmond, VA 23228; phone (804) 261-2600; Web site: va.water.usgs.gov.

International Coastal Cleanup

Clean Virginia Waterways (CVW) sponsors this annual cleanup of Virginia's beaches, streams, and rivers. The "official" date for the 2005 cleanup is September 17, but cleanup events make take place anytime in September or October. Along with the trash, volunteers are asked to collect data on what's found and where. CVW provides supplies and other help. For more information: Kathleen Register, (434) 395-2602, cleanva@longwood.edu; Web site: www.longwood.edu/cleanva/iccva.htm

Upcoming Conferences and Workshops

In Virginia

•**Virginia Environmental Assembly.** September 24-25 in Ashland. Sponsored by the Virginia Conservation Network. For more information: Carey Whitehead, carey.vcn@gmail.com.

Elsewhere

•**Mid-Atlantic Green Highway Forum.** September 26-29 in College Park, Maryland. Sponsored by the Wetlands and Watersheds Work Group. More information: Frank Reilly, (540) 286-0072, or executivedirector@wetlandsworkgroup.org; Web site: www.wetlandsworkgroup.org.

•**25th Biennial Groundwater Conference and 14th Annual Groundwater Resources Association Meeting.** October 25-26 in Sacramento, California. Sponsored by the Univ. of California Center for Water Resources. More information: (951) 827-4327 or cwres@ucr.edu; Web site: www.waterresources.ucr.edu.

•**"Volunteer Monitoring in the Mid-Atlantic: Citizen Scientists Involved in the Watershed."** November 4-5 in Canaan Valley State Park, West Virginia. Sponsored by the West Virginia Conservation Agency. More information:

(304) 558-0382 or jthompson@wvca.us; Web site: www.wvca.us/workshops/vmc.

•**"Environmental Results Using Market-Based Approaches."** December 5-7 in Atlantic City, New Jersey. Sponsored by the U.S. EPA Region 3. More information: Andrew Seligman, (215) 814-2097 or Seligman.andrew@epa.gov; Web site: www.wetlandsworkgroup.org.

Also Out There...

From the many water-related publications that arrive in the Water Center's mail, here's a brief description of some recent detailed articles:

•**"Conservation Easements: What Are They and Who Participates?"**—Explains conservation easements, discusses tax considerations for donating easements, and describes the results of a survey of donors. *Horizons*, January-February 2005. Virginia Tech Department of Agricultural and Applied Economics, Blacksburg; (540) 231-9443 or reap01@vt.edu; available online at www.reap.vt.edu.

•**"Chesapeake Cleanup Update"**—The second in a series of annual reports on efforts to reduce the amount of nutrients and sediment reaching the Chesapeake Bay; included are detailed tables on the estimated loads in 1985 and 2003 of nitrogen, phosphorus, and sediment for each river basin and major source, along with the 2010 goals for reducing these loads within each basin. *Bay Journal*, March 2005. Alliance for the Chesapeake Bay, (717) 428-2819 or bayjournal@earthlink.net; available online at www.bayjournal.com.

•**"Coming Clean in Chesapeake's Money Point"**—Discusses the history of a large industrial area along the Elizabeth River, its impact on the river, and prospects for revitalization of the area. *Virginian-Pilot*, June 13, 2005. To request the article, phone (800) 446-2005 or visit the newspaper's Web site at www.hamptonroads.com/pilotonline.

•**"Chesapeake Cleanup: Ripples from the Bay"**—A special report on the connection between the Bay and water-resource issues in the Shenandoah Valley. *Staunton News-Leader*, June 19, 2005. To request the report, phone (800) 793-2459 or visit the newspaper's Web site at www.newsleader.com/apps/pbcs.dll/frontpage.

AT THE VIRGINIA WATER CENTER

To reach the Virginia Water Resources Research Center: phone (540) 231-5624; FAX (540) 231-6673; e-mail water@vt.edu; Web site www.vwrrc.vt.edu.

Staff Changes

Judy Poff left the Water Center on July 1, 2005, after 13 years as the Center's public relations coordinator and over 30 years of service at Virginia Tech. *Water Central* will carry a more detailed item on Ms. Poff in the next issue.

Annabelle Fusilier left the Water Center on August 12, 2005, after five years as an administrative and program specialist. During her time, Ms. Fusilier was responsible for maintaining the Center's Web site, compiling the online "Daily News Update," responding to requests for information or publications, managing the daily operations of the Center, assisting with financial documentation, and supporting various other Center functions. She is traveling to Carbondale, Illinois, where she will serve an internship with Chi Alpha Campus Ministries at Southern Illinois University.



New Publication

"Emerging Threats to Drinking Water Quality," by Tamim Younos. *Renewable Resources Journal*, Vol. 23 (No. 2), pp. 6-12.

2005 Competitive Grant Awards

The following projects have received competitive-grant awards for Fiscal Year 2005-06:

"Fate of endocrine-disrupting compounds in dairy manure during storage and treatment." Investigators: Katherine Knowlton, Dairy Science; Nancy Love, Civil and Environmental Engineering; and Jactone Ogejo, Biological Systems Engineering (all at Virginia Tech).

"Effect of chloramines on lead leaching, bacterial growth, and non-uniform copper corrosion." Investigator: Marc Edwards, Civil and Environmental Engineering, Virginia Tech.

"Spatial and temporal patterns of recharge in karst agricultural watersheds." Investigator: Madeline Schreiber, Geosciences, Virginia Tech.

"Biomarker responses in Eastern Mosquitofish (*Gambusia holbrooki*) during life-cycle exposure to biosolids." Investigator: Peter van Veld, Virginia Institute of Marine Science.

2005 Fellowship and Internship Awards

Congratulations to these award winners:

William R. Walker Graduate Research Fellow Award: Kevin R. Gilmore, Virginia Tech Department of Civil and Environmental Engineering.

Undergraduate Research Summer Fellowships: Courtney Capstack, Virginia Tech Horticulture major; and Ross Phillips, Virginia Tech Urban Affairs and Planning major.

Multicultural Academic Opportunities Summer Research Internship: Cecilia Crenshaw, Alabama A&M University.

Service Training for Environmental Progress (STEP) Summer Internships: Catherine Melvin, Longwood University; Carleen Woo, Long Island University; and Christian Yates, Bridgewater College.

Grants Received

Water Quality Academic Advisory Committee work plan for FY 2005-06 (for more information, contact Tamim Younos, [540] 231-8039 or tyonos@vt.edu):

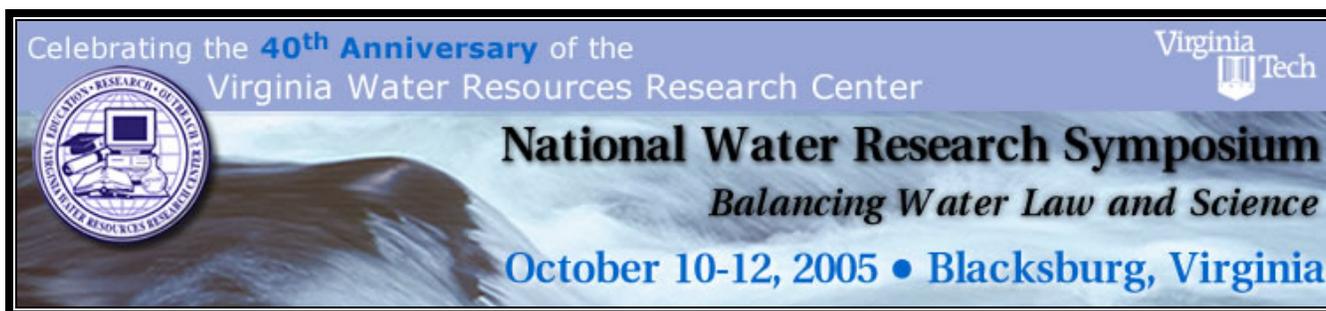
\$25,000 from the Virginia Department of Environmental Quality (DEQ) for work on freshwater nutrient criteria. The objective is to recommend how the DEQ should approach criteria development for rivers and streams.

\$6,987 from the DEQ for work on The Virginia Stream Condition Index. The objective is to facilitate the peer review of the index, which is being developed by a private consultant.

Virginia Water Monitoring Council (VWMC) grants (for more information, contact Jane Walker, [540] 231-4159 or janewalk@vt.edu):

\$10,000 from Altria Group, Inc., to develop an inventory and database of groundwater monitoring activities throughout the Commonwealth. Grant period: April 7, 2005 to December 31, 2005.

\$5,000 from the Virginia Department of Health to provide public notification of beach monitoring information in Virginia. Grant period: December 1, 2004 to November 30, 2005.



About the Symposium

In 1964, the U.S. Congress authorized the establishment of national water institutes at land grant universities under provisions of the Water Resources Research Act. The Virginia Water Resources Research Center (Water Center) was established at Virginia Tech in 1965. The mission of the Water Center is to provide research and educational opportunities to future water scientists; promote research on practical solutions to water resource problems; and facilitate the timely transfer of water science information to policy/decision-makers and to citizens.

The 40th anniversary of founding the Water Center features nationally known keynote speakers,



workshops, research presentations, and a series of science and policy forums that address critical water issues in Virginia and across the United States. The forums, consisting of expert panelists from government and academia, will facilitate an open discussion of topics related to the scientific basis of water laws, conflicts within existing water laws and regulations, and case studies of interest. Research presentations will include discussions of emerging and critical water resource issues. The two workshops will facilitate a discussion of conflict resolution strategies in water resources and an innovative approach for developing a water quality index to evaluate and rate surface water quality.

Who Should Attend

This symposium is for state and local government professionals, university faculty and students, experts from environmental consulting and environmental law firms, and other interested groups and individuals.

How To Register

The program begins on October 10 with the 1:30 p.m. welcome and ends on October 12 at 2:00 p.m. The full registration fee is \$195 (\$100 for students). The fee includes pre-conference workshops, a reception on October 10, refreshment breaks, and lunch on October 11 and 12. The fee for the October 10th pre-conference workshops only is \$50 (includes the morning sessions and refreshment break).

Registration deadline is September 26.

To register online, please visit the Virginia Tech Continuing Education Center Web page at <https://www.conted.vt.edu/ssl/vwrs/index.lasso>.

For More Information

Please visit the Web site listed above, or contact Tamim Younos, Interim Director, Virginia Water Resources Research Center, phone (540) 231-5624, e-mail tyounos@vt.edu.

FOR THE RECORD

Sources for Selected Water Resources Topics

Maps for Water Resources

This topic was previously covered in the January 2001 *Water Central*. Previous issues of *Water Central* are available online at www.vwrrc.vt.edu/central/virginia.htm; for a paper copy, phone (540) 231-5463. This section updates previous information and lists some new sources (*many* other sources are available online, at libraries, from governmental agencies, and from colleges and universities).

•**U.S. Geological Survey (USGS):** The USGS “Maps and other products” Web page (both for products online and to order) is at ask.usgs.gov/products.html. The phone number for USGS information or ordering assistance is (888) ASK-USGS. The USGS Web site, “**Geography**,” at geography.usgs.gov/, includes links to maps and geographic data, but it also has information about the science of geography and its uses, National Mapping Program standards, and other topics. **The National Map**, online at nationalmap.gov, is an online, interactive map service providing access to geographic information from many governmental agencies.

•**The National Atlas of the United States**, on-line at nationalatlas.gov, is another online, interactive mapping tool, produced by the U.S. Department of the Interior (also the home of the USGS). The Atlas was revised in 2005 with changes designed to make it easier to find and use geographic information. The “**Geospatial One Stop**,” begun in 2005, offers maps, applications, and data for mapping professionals.

•**The Virginia Geographic Information Network (VGIN)**, now within the Virginia Information Technologies Agency, is still the state’s lead agency for geographic information systems (GIS). VGIN’s Web-site is still www.vgin.vipnet.org.

•**Water Atlas of Virginia.** The publisher, Tennyson Press, is at P.O. Box 1599, Lexington, VA 24450; (540) 463-2599.

•**Virginia Hydrologic Unit Atlas.** This 1995 book showing hydrologic units within each Virginia county is still available in libraries, but more recent maps are available online at the Virginia Department of Conservation and Recreation’s “**Hydrologic Unit Geography**” Web site, www.dcr.virginia.gov/sw/hu.htm.

•**Virginia Dept. of Mines, Minerals, and Energy/Division of Mineral Resources:** The agency’s Web page for ordering mineral-related maps is www.dmme.virginia.gov/commerce/. The phone number for the Mineral Resources Division is now (434) 951-6340.

•**Ground-Water Resources of the Untied States** (published in 1983) is still available in larger libraries, but a more recent, comparable source is the **Groundwater Atlas of the United States**, a series of 13 publications on important U.S. aquifers. The series is available online at capp.water.usgs.gov/gwa/gwa.html, or in print by contacting the USGS at (888) ASK-USGS.

•**Water Quality Maps:** The *Atlas of America’s Polluted Waters*, published by the U.S. Environmental Protection Agency (EPA), apparently has not been updated since 2000. The EPA now offers **EnviroMapper for Water**, an online mapping tool for surface water quality, at www.epa.gov/waters/enviromapper/. The **Virginia Department of Environmental Quality** Web site at gisweb.deq.state.va.us provides recent maps showing Virginia’s impaired waters and associated water-quality data.

•**Oil Spill Cleanup and Response (OSCAR)**, the Virginia Institute of Marine Science’s (VIMS) online mapping program primarily for the Chesapeake Bay, is now available at ccrm.vims.edu/OSCAR_intro.html. VIMS’ **Center for Coastal Resource Management (CCRM)** Web page at ccrm.vims.edu/mappingtools.html offers several other online mapping tools.

•**The Virginia Forest Resource Information Mapper**, an online tool released by the Virginia Department of Forestry in 2004, is available at www.forestrim.org.

•**The Virginia Canals and Navigations Society** publishes and sells atlases and strip maps showing historical and boating information for several Virginia rivers. For more information, contact the Society in McLean at (703) 356-4027; Web site: organizations.rockbridge.net/canal/.

—By Alan Raflo

Next “For the Record”:
Coastal and Marine Information Sources.
Please see the January 2005 issue of *Water Central*
for a list of all previous “For the Record” topics.

Virginia Water Central

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